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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/663,038	Applicant(s) JELKS, EDWARD CHRISTIAN
	Examiner Sherif R. Fahmy	Art Unit 2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-15 and 17-22* is/are rejected.

7)☒ Claim(s) *9 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 13 recites the limitation "the high gain optical feedback modulator" in lines 23-24. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 8, 10 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith.

Regarding claim 8, Smith teaches

A high efficiency optical feedback modulator comprising:

An optical modulator having at least two optical inputs and at least two optical outputs; and

An optical feedback system coupling at least one of the optical outputs to at least one of the optical inputs. (See for example fig. 3A).

3. Regarding claim 10, in the optical feedback system an optical amplifier disposed between the second optical output and the second optical input (see for example 12 in fig. 1).

4. Regarding claim 11, the optical feedback system comprises an optical waveguide (see for example fig. 3A).

5. Claims 8, and 11-13 rejected under 35 U.S.C. 102(b) as being anticipated by Cao.

Regarding claim 8, Cao teaches

A high efficiency optical feedback modulator (see for example 220 in fig. 2) comprising:

An optical modulator having at least two optical inputs and at least two optical outputs (see for example 237 and 238); and

An optical feedback system coupling at least one of the optical outputs to at least one of the optical inputs.

6. Regarding claim 11, Cao teaches that the optical feedback system comprises an optical waveguide (see for example 242 and 244).

7. Regarding claim 12, Cao teaches that the high efficiency optical feedback modulator comprises a first and a second phase modulator (see for example fig. 2, modulators around 235 and 236; see for example abstract).

8. Regarding claim 13, Cao teaches that the high efficiency optical feedback modulator is disposed within an optical repeater (see for example abstract).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 14, 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Brock.

3. Regarding claim 14, Smith teaches a high efficiency optical feedback modulator operable to receive an electronic input signal and intensity modulate an input light beam with the electronic input signal to produce a high modulation depth optical signal, the high efficiency optical feedback modulator comprising (see for example fig. 3A):

An optical modulator (8) having at least two optical inputs and at least two optical outputs; and an optical feedback system coupling at least one of the optical outputs to at least one of the optical inputs;

An optical fiber coupled to an optical output of the optical modulator and operable to communicate the modulated optical signal (see for example fiber shown in figure, next to "DATA OUT"); and

An optical receiver operable to receive the modulated optical signal and convert the modulated optical signal into an electronic output signal (see for example "DATA OUT".

Smith does not specifically teach a high modulation depth optical signal from the first optical output. Brock teaches an optical modulator with optical feedback (see for

example fig. 1), where the modulator is to provide high modulation depth. Brock teaches that high modulation depth improves the performance of the demodulator on the receiving end (see for example col. 1- lines 45-47, and col. 1- lines 59-62). at the time the present invention was made, it would have been obvious to one having ordinary skill in the art to provide high modulation depth, as taught in Brock, in the modulator of Smith, in order to improve performance in the demodulator.

4. Regarding claim 18, Smith teaches an originating system operable to produce the electronic signal, and a destination system operable to receive the electronic output signal (this is inherent to the teaching due to the fact that all signals to be transmitted in the art of optical communication are always processed electronically prior to optical transmission and after optical reception).

5. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Brock as applied to claim 18 above, and further in view of Darcie. The combined teaching of Smith and Brock does not specify that the originating system comprises a cable television system and the destination system comprises a user distribution system. However, cable television originating systems using optical communication, and destination systems comprising a used distribution system are old and well known in the art, and necessarily require optical modulation (see for example Darcie fig. 1). At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use the modulator of the combined teaching in a cable television distribution system as taught in Darcie. One having ordinary skill in the art would have been motivated to do this because optical cable television distribution systems such as

Darcie's are known to offer high bandwidths, over long distance, to a large number of subscribers.

6. Claims 14, 17, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Brock.

Regarding claim 14, Cao teaches a high efficiency optical feedback modulator operable to receive an electronic input signal and intensity modulate an input light beam with the electronic input signal to produce a high modulation depth optical signal, the high efficiency optical feedback modulator comprising:

An optical modulator having at least two optical inputs and at least two optical outputs; and an optical feedback system coupling at least one of the optical outputs to at least one of the optical inputs;

An optical fiber coupled to an optical output of the optical modulator and operable to communicate the modulated optical signal; and

An optical receiver operable to receive the modulated optical signal and convert the modulated optical signal into an electronic output signal.

Cao does not specifically teach a high modulation depth optical signal from the first optical output. Brock teaches an optical modulator with optical feedback (see for example fig. 1), where the modulator is to provide high modulation depth. Brock teaches that high modulation depth improves the performance of the demodulator on the receiving end (see for example col. 1- lines 45-47, and col. 1- lines 59-62). at the time the present invention was made, it would have been obvious to one having ordinary skill in

the art to provide high modulation depth, as taught in Brock, in the modulator of Smith, in order to improve performance in the demodulator.

7. Regarding claim 17, Cao does not specifically teach that the electronic input signal comprises an analog signal. However, Brock teaches an optical modulator wherein the electrical signal is an optical signal (see for example fig. 1, "RF INPUT"). at the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use an analog electrical signal in the teaching of Cao. One having ordinary skill in the art would have been motivated to do this since optical signals are useful for carrying analog data, such as analog audio and video, and since analog signals are well suited for representing high quality audio and video.

8. Regarding claim 18, Cao teaches an originating system operable to produce the electronic signal, and a destination system operable to receive the electronic output signal (this is inherent to the teaching due to the fact that all signals to be transmitted in the art of optical communication are always processed electronically prior to optical transmission and after optical reception).

9. Regarding claim 20, Cao teaches at least one high gain optical repeater disposed in-line with the optical fiber (see for example fig. 1; see for example abstract).

10. Claims 1-4, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Brock.

Regarding claim 1, Cao teaches a high efficiency optical feedback modulator operable to produce a high modulation depth optical signal, comprising:

An optical modulator (see for example 220 in fig. 2) having a first and a second optical input and a first and a second optical output (see for example fig. 1, 237 and 238).

An optical feedback system coupling the second optical output to the second optical input and operable to communicate an optical feedback signal from the second optical output to the second optical input (see for example 242 and 244); and

Wherein the first optical input ("INPUT FROM FILTER 18") is operable to receive an input light beam and the optical modulator operates to modulate the input light beam and the optical feedback signal in response to an electrical signal (V1 INPUT FROM DRIVE V. 28), to output the modulated optical signal rom the first optical output ("OUTPUT TO WDM 30").

Cao does not specifically teach a high modulation depth optical signal from the first optical output. Brock teaches an optical modulator with optical feedback (see for example fig. 1), where the modulator is to provide high modulation depth. Brock teaches that high modulation depth improves the performance of the demodulator on the receiving end (see for example col. 1- lines 45-47, and col. 1- lines 59-62). At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to provide high modulation depth, as taught in Brock, in the modulator of Cao, in order to improve performance in the demodulator.

11. Regarding claim 3, in the combined teaching, the optical feedback system comprises an optical waveguide (see for example fig. 2, 242 and 244).

12. Regarding claim 6, the optical modulator of the combined teaching further comprises a first and a second phase modulator (see for example fig. 2, modulators around 235 and 236; see for example abstract).

13. Regarding claim 7, the high efficiency optical feedback modulator of the combined teaching is disposed within an optical repeater (see for example abstract).

14. Regarding claim 2, Cao does not specifically teach that the optical feedback system includes an optical amplifier disposed between the second optical output and the second optical input. Brock teaches an optical amplifier disposed between an output and an input of an optical modulator in feedback system. at the time the present invention was made, it would have been obvious to one having ordinary skill in the art to include an optical amplifier as taught by Brock in a feedback system as taught by Cao. One having ordinary skill in the art would have been motivated to do this in order to increase the strength of the feedback signal, for instance in the event that feedback coupling is not sufficiently strong.

15. Regarding claim 4, Cao does not specifically teach that the electrical signal comprises an analog signal. However, Brock teaches an optical modulator wherein the electrical signal is an optical signal (see for example fig. 1, "RF INPUT"). at the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use an analog electrical signal in the teaching of Cao. One having ordinary skill in the art would have been motivated to do this since optical signals are useful for carrying analog data, such as analog audio and video, and since analog signals are well suited for representing high quality audio and video.

16. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Brock as applied to claim 1 above, and further in view of William. The combined teaching of Cao and Brock does not specifically include that the optical modulator further

comprises a first and second 3dB coupler. However, the combined teaching does include a first and second optical coupler (see for example WDM1 and WDM2 in fig. 3A). Furthermore, William teaches that the 3 dB couplers are useful because they exhibit low loss characteristics. at the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use 3 dB couplers as taught in William for the couplers taught in the combined teaching. One having ordinary skill in the art would have been motivated to do this because such couplers are known to exhibit low loss, and are well know known in the art.

17. Claims 21 and 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Brock.

Regarding claim 21, Smith teaching a method for producing a high modulation depth optical signal comprising:

Communicating an input light beam to a first optical input of an optical modulator (see for example 7 in fig. 3A);

Communicating an optical feedback signal from a second optical output of the optical modulator to a second optical input of the optical modulator (see for example fig. 3A);

Coupling the input light beam with the optical feedback signal to produce a first and second phase shift optical signal (see for example col. 4- lines 8-19);

Intensity modulating at least one of the optical signals to produce a first and a second phase shift optical signal; and

Coupling the phase shift optical signals to produce the high modulation depth optical signal and the optical feedback signal.

Smith does not specifically teach intensity modulating with an *electronic* input signal (see "DATA IN" in Cao). However Cao teaches modulating with an electronic input signal (see for example "RF INPUT" in fig. 1). At the time the present invention was made, it would have been obvious to one having ordinary skill in the art to use an electronic signal. One having ordinary skill in the art would have been motivated to do this because processing signals in electronic format prior to optical modulation and transmission is conventional, and is well known to be cheaper and more easily implemented (electrical signal processing being a much more mature art that optical signal processing).

18. Regarding claim 22, The combined teaching comprises the step of amplifying the optical feedback signal prior to communicating the optical feedback signal to the second optical input of the optical modulator (see for example 6 in fig. 3A in Smith).

Allowable Subject Matter

19. Claims 9 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter: Though the prior art teaches a high efficiency optical modulator with at least two inputs and two outputs with an optical feedback coupling at least one of the optical outputs to at least one of the optical inputs (see claim rejections above), none teaches that

the optical modulator comprises a Mach-Zehnder two-by-two optical modulator comprising a first and second optical input, and a first optical output that is the complement of a second optical output, and wherein the feedback system couples the second optical output to the second optical input. It does not appear that it would have been obvious to one having ordinary skill in the art to use such a modulator in the systems taught in the prior art.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamada is cited for disclosing an optical modulator with optical feedback. Watanabe is cited for disclosing an optical modulator, with optical feedback, within a repeater. Ohya is cited for disclosing an optical amplifier in an optical feedback line. Lemoff is cited for disclosing an optical modulator with optical feedback.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sherif R. Fahmy whose telephone number is 703-305-8088. The examiner can normally be reached on 8:30AM-6:00PM(Mo-Th) 8:30AM-5:00PM(2nd & 4th Fr).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703-305-4729. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3988 for regular communications and 703-305-3988 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4800.

SRF
June 28, 2003

LESLIE PASCAL
PRIMARY EXAMINER